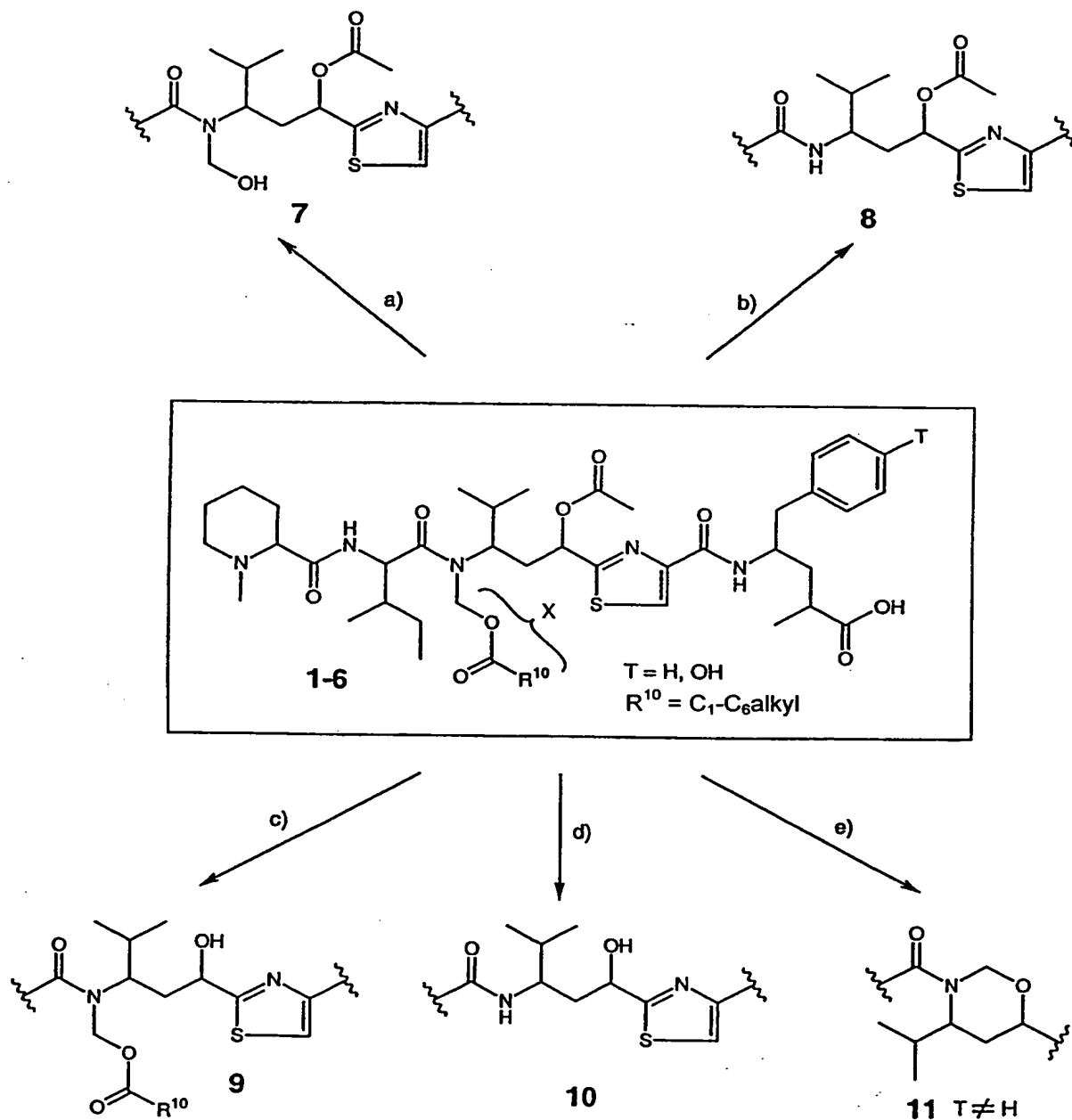
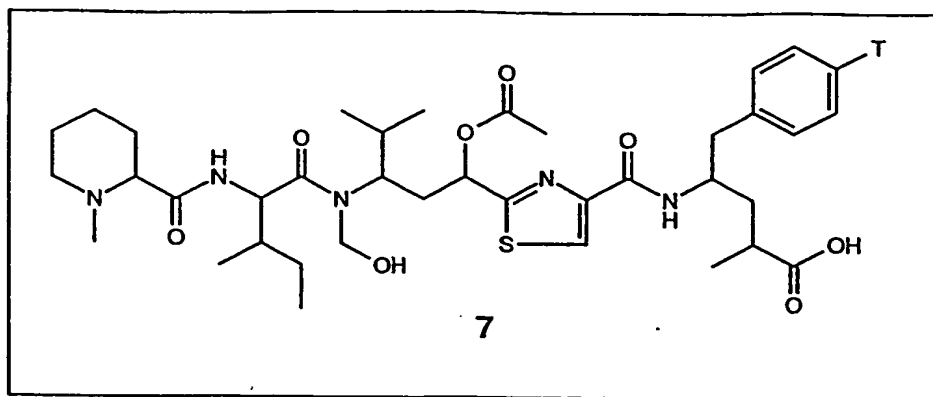


1/9

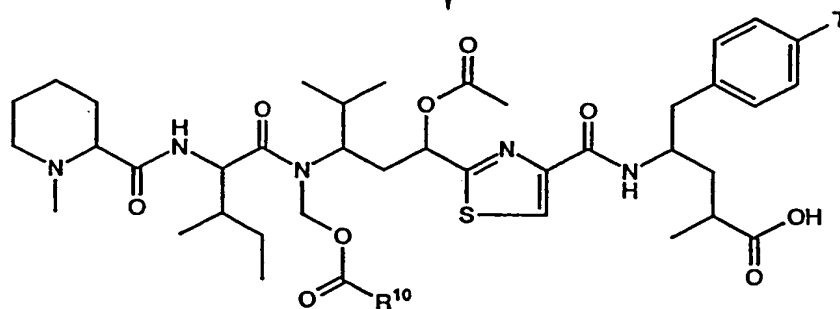


a) 0.1 M HCl, dioxane, 50°C; b) 0.1 M HCl, 100°C; c)  $NH_3$ , MeOH; d) 1 M NaOH, MeOH; e) 0.5 M HCl, 100°C

2/9

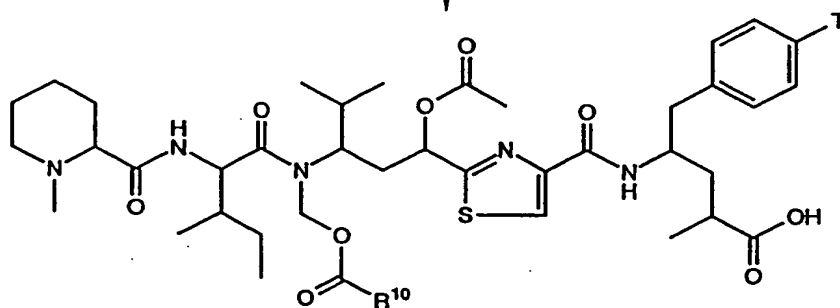


a)



$T = H, OCOR^5$   
 $R^{10} = C_1-C_6\text{alkyl}, C_1-C_6\text{alkenyl}, \text{aryl}, \text{heteroaryl}$

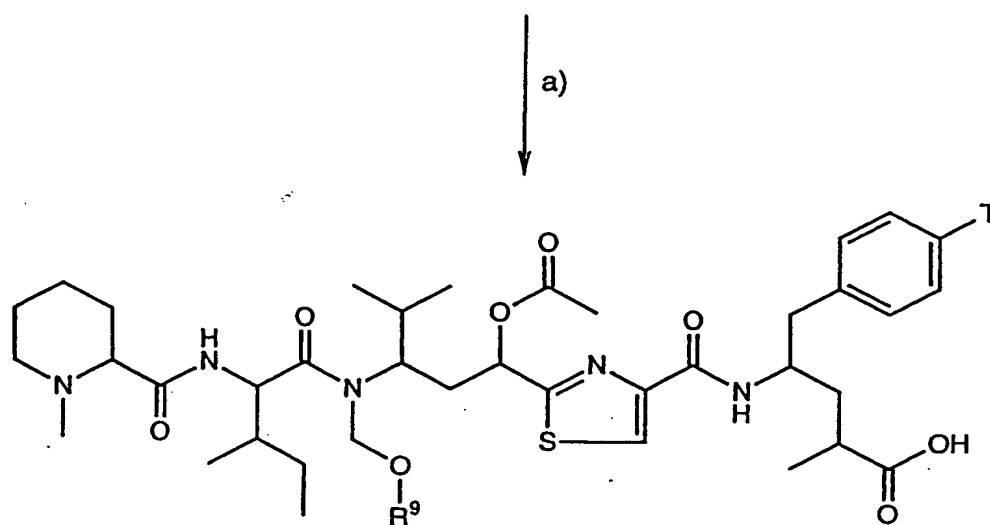
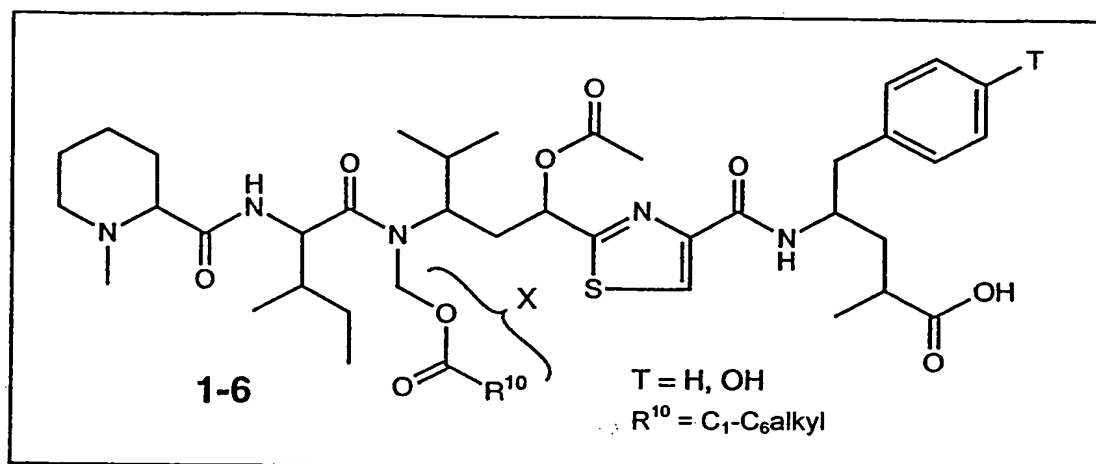
b)



$T = H, OH$   
 $R^{10} = C_1-C_6\text{alkyl}, C_1-C_6\text{alkenyl}, \text{aryl}, \text{heteroaryl}$

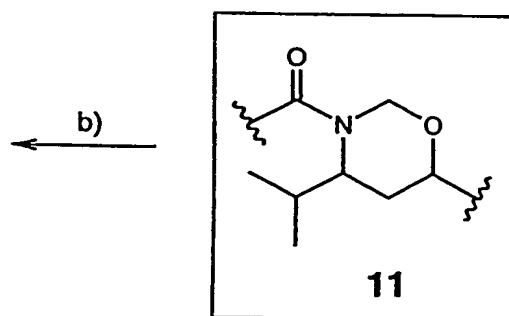
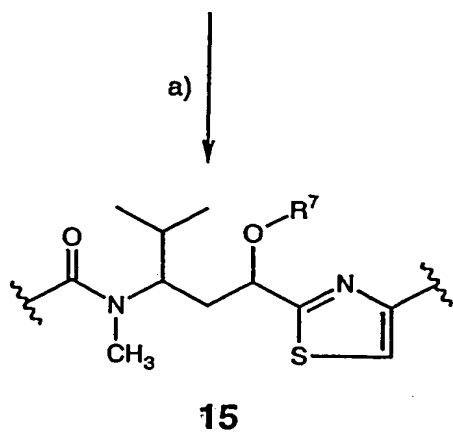
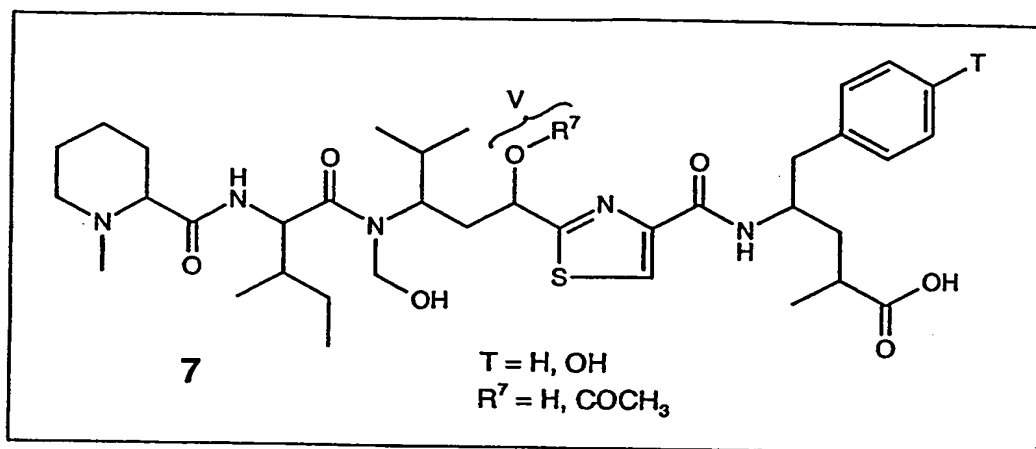
a)  $R^{10}COCl, Et_3N$ ; b)  $NH_3$

3/9



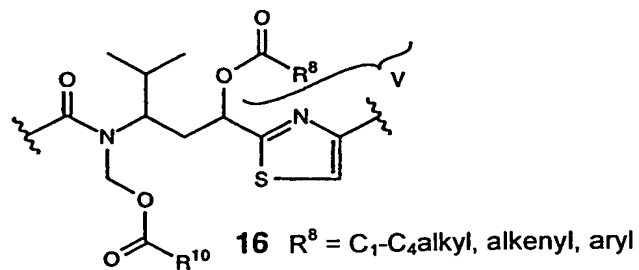
a)  $p\text{-CH}_3\text{-C}_6\text{H}_4\text{SO}_2\text{OH}$ ,  $R^9\text{OH}$ , THF,  $80^\circ\text{C}$

4/9

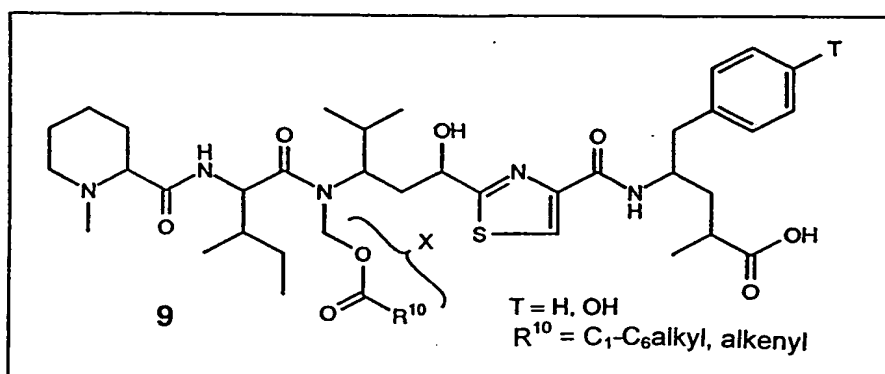


a)  $NaCNBH_3$ , TFA, MeOH; b)  $NaCNBH_3$ ,  $Me_3SiCl$ ,  $CH_3CN$

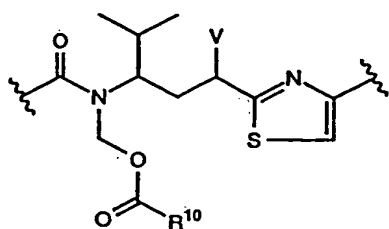
5/9



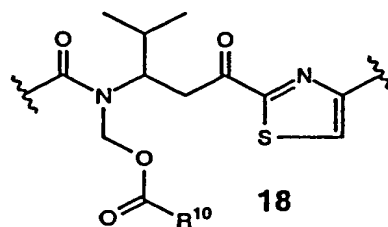
a)



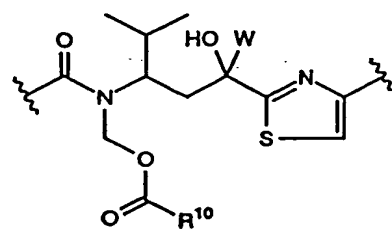
b)



c)

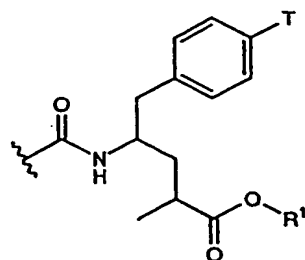
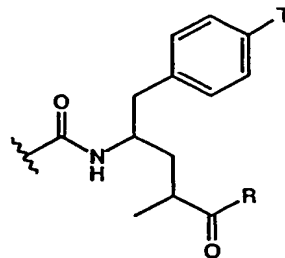


d)

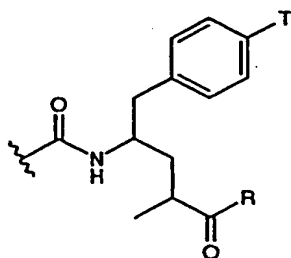
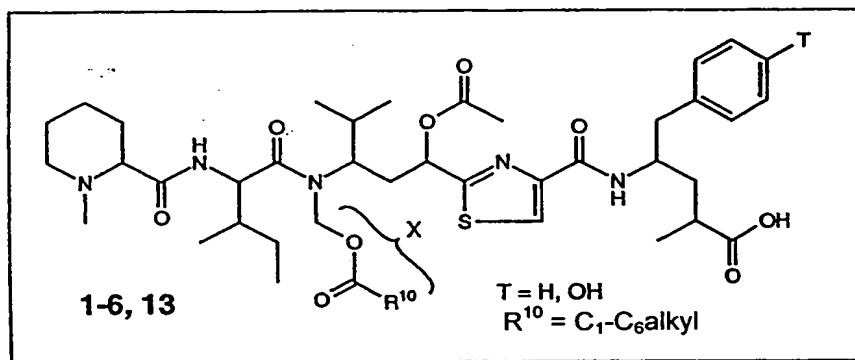
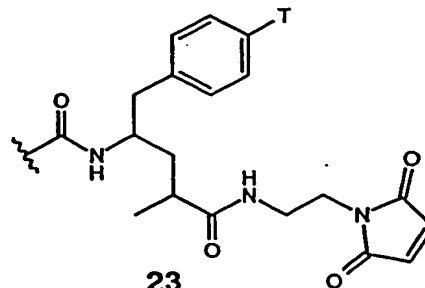


a)  $R^8\text{COCl, Et}_3\text{N}$ , b)  $\text{Pd/C, H}_2, \text{CH}_3\text{COOH}$  or DAST;  
c) TPAP, NMO; d)  $\text{WMgHal}$

6/9

20  $R^1 = C_1-C_4\text{alkyl, alkenyl}$ 

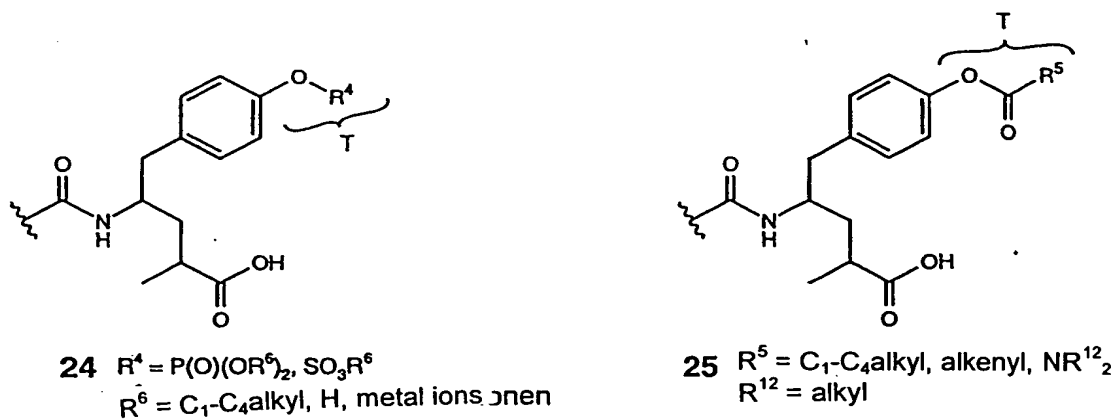
21  $R = \text{NHR}^1, \text{NH-NR}^1\text{R}^2, \text{NHOR}^1, \text{NH}(\text{CH}_2)_{2-4}\text{NR}^1\text{R}^2$   
 $R^1 = \text{H, C}_1\text{-C}_6\text{alkyl, aryl}$   
 $R^2 = \text{H, C}_1\text{-C}_6\text{alkyl, aryl}$

22  $R = C_1-C_4\text{alkyl, alkenyl}$ 

23

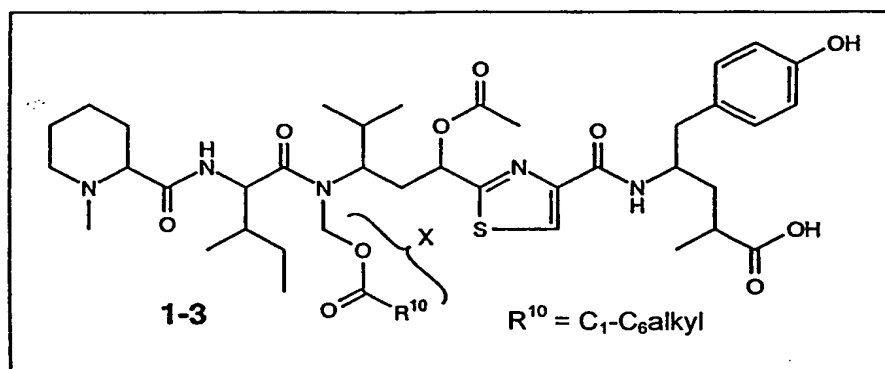
a) EDC,  $R^1\text{OH}$ , DMAP,  $\text{CH}_2\text{Cl}_2$ ; b) EDC, RH,  $\text{CH}_2\text{Cl}_2$  or isobutyl chloroformate,  $\text{Et}_3\text{N}$ , RH, abs. THF  
 c) RLi; d) EDC, 1-(2-aminoethyl)-pyrrole-2,5-dione,  $\text{CH}_2\text{Cl}_2$

7/9



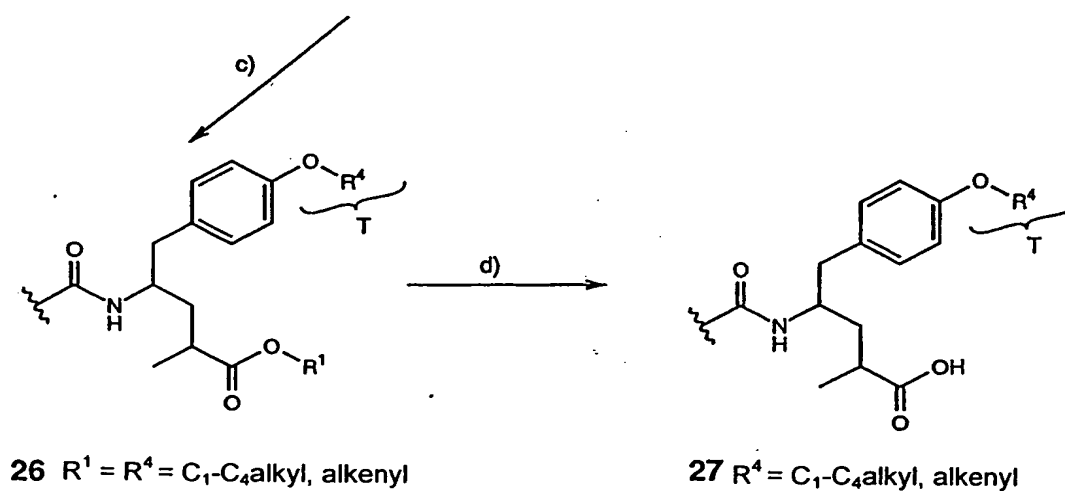
a)

b)



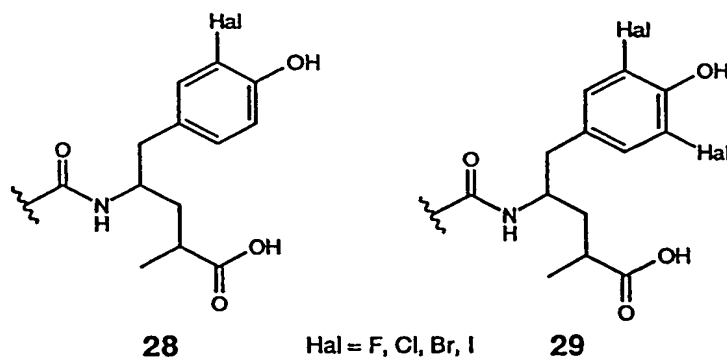
c)

d)

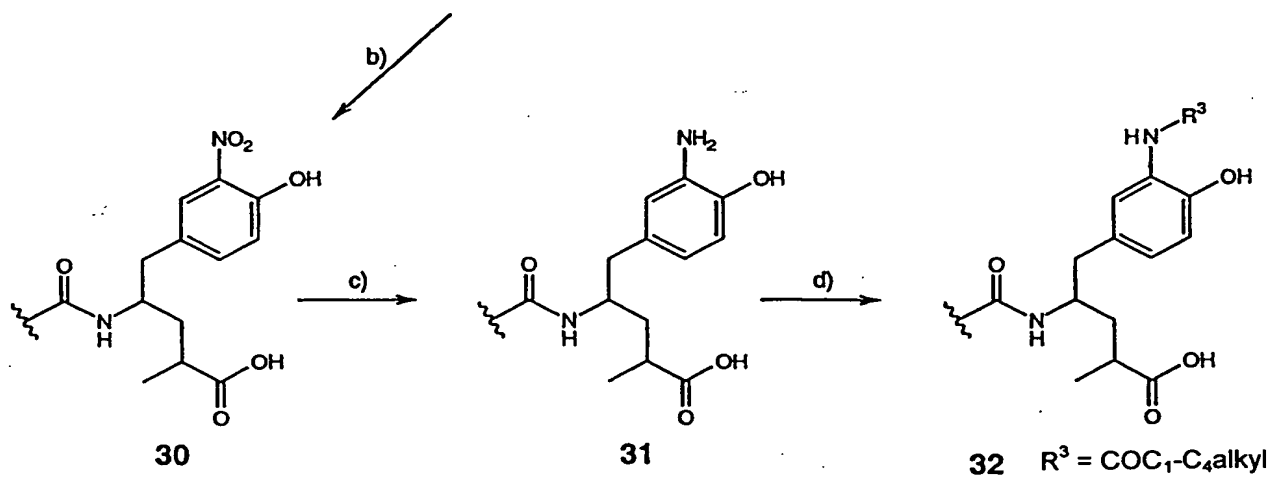
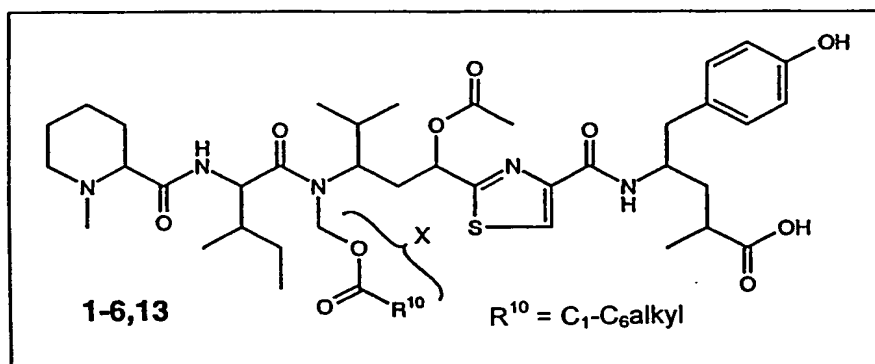


a)  $P(O)(OR^6)_2OH$ ,  $I_2$ , pyridine,  $CH_2Cl_2$  or pyridine- $SO_3$ ; b)  $R^5COCl$ ,  $Et_3N$ , abs. THF;  
 c)  $Ag_2O$ ,  $R^4I$ ,  $CH_2Cl_2$ ; for  $R^4 = CH_3$ ;  $CH_2N_2$ , MeOH; d) pig liver esterase,  $KH_2PO_4$  buffer,  $36^\circ C$ ;

8/9



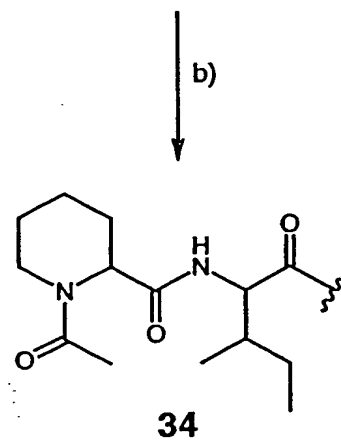
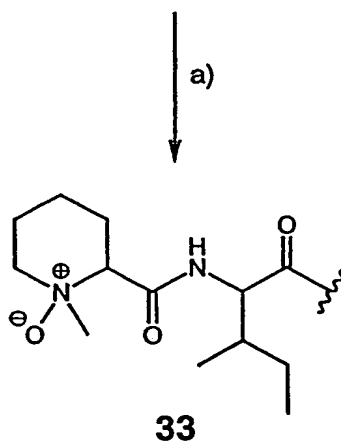
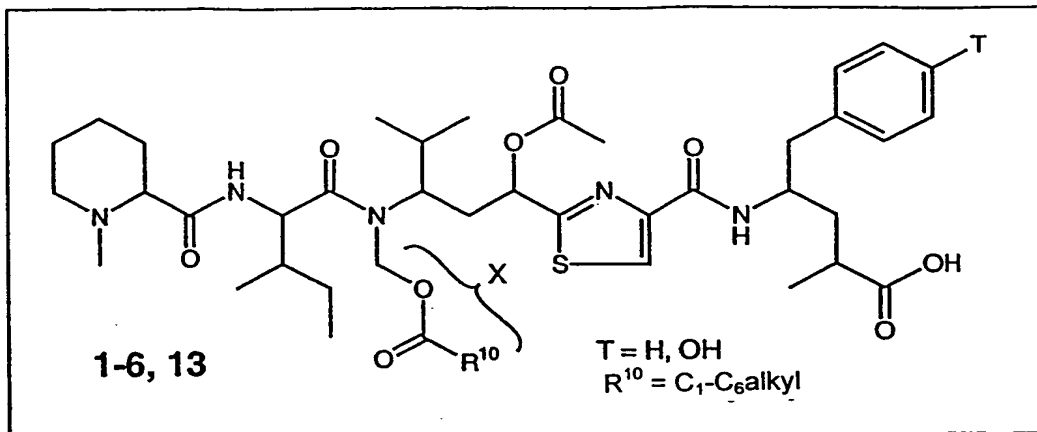
$\uparrow$   
 a)



a)  $\text{C}_3\text{Cl}_5\text{NF}$  triflate,  $\text{SO}_2\text{Cl}_2$ , NBS, ICl; b)  $\text{NaNO}_2$ ,  $\text{CH}_3\text{COOH}$ , EtOH; c)  $\text{Pd/C}$ ,  $\text{H}_2$ , EtOH; d)  $(\text{R}^3\text{CO})_2\text{O}$



9/9



a) *m*-CPBA,  $CH_2Cl_2$ ; b)  $Ac_2O$ ,  $75^\circ C$